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ABSTRACT

On March 1989, the Aspen Institute convened a group of experts to assess Soviet progress in computer and information technologies, their current and likely impact on Soviet society, and appropriate ways for U.S. policymakers to respond. Major issues addressed by conference participants included: Will new information technologies encourage a decentralization of authority in Soviet society? How will the new technologies affect human rights, if at all? How will they affect the Soviet Union's economic prospects? and Can the United States influence any of these computer-related trends through its foreign policies or trade policies? The conference consisted of seven sessions, each of which was devoted to a specific issue. Session titles were: (1) The Social Impact of Computer Use; (2) Computers as Decentralizing Forces? (3) A Portrait of Soviet Computer and Information Technologies; (4) Does Computerization Require an Open Society? (5) Soviet Computer Culture as a Reformist Vanguard? (6) Should "the West" Encourage Soviet Computerization? and (7) What Next? Proposals for Research and Action. A list of conference participants is included. (GL)

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Communications and Society
FORUM REPORT

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THE SOCIAL IMPACT OF WIDESPREAD COMPUTER USE:
Implications for East-West Relations

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Report of an Aspen Institute Conference
Wye Woods Conference Center
Queenstown, Maryland
March 23–25, 1989

by
David Bollier
Contributing Editor
CHANNELS Magazine

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An independent, international, nonprofit organization, the Aspen Institute brings together leading citizens to discuss issues of lasting significance. Its Program on Communications and Society serves as an impartial forum for assessing the importance of modern communications and information systems to the ideals and practices of democratic society.

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The Social Impact of Widespread Computer Use: Implications for East-West Relations

On March 23-25, 1989, The Aspen Institute convened a distinguished group of experts to assess Soviet progress in computer and information technologies, their current and likely impact on Soviet society, and appropriate ways for U.S. policymakers to respond.

Recent glasnost and perestroika reforms aspire to remake much of Soviet society, introducing market principles to economic production and new civil freedoms to the culture. Within limits, General-Secretary Gorbachev apparently hopes to encourage greater efficiency and vitality in the Soviet economy; more open, creative social expression; stricter political accountability for Party leaders; and greater political participation among the Soviet people.

As the Soviets grapple with these profound changes, it is logical to wonder what role computers and information technologies will play. Will the technologies encourage a decentralization of authority in Soviet society? How will they affect Soviet human rights, if at all? How will they affect the Soviet Union's economic prospects? More pragmatically, can the United States influence any of these computer-related trends through its foreign policies or trade policies? This Aspen Institute conference, sponsored by the Ford Foundation and the U.S. Congress' Office of Technology Assessment, sought to address these and other related questions.

Conference participants consisted of scholars of Soviet and Eastern European studies; analysts of Soviet science and technology; experts on the organizational uses and social and psychological impact of information technologies; government researchers who assess the public policy implications of information technologies; the president of a major computer contractor for the U.S. Government; the director of an activist group of socially concerned computer professionals; journalists familiar with Soviet affairs; experts on Soviet human rights; and participants in an exhibition of U.S. information technologies, sponsored by the U.S. Information Agency, which toured the Soviet Union in 1988.

The conference consisted of seven sessions, each of which was devoted to a specific issue. Michael Rice, Director of The Aspen Institute Program on Communications and Society, moderated the discussions.

I. THE SOCIAL IMPACT OF COMPUTER USE

How should we characterize the social impact of widespread computer use where it has already occurred?

Before making an empirical inquiry into Soviet use of computer technologies, the group first conducted a sort of "meta-dialogue" about the proper methodologies for proceeding. Why do computer technologies develop? What general purposes do they serve? What social impact do they usually have?

To provide an analytic framework for discussion, Professor James Beniger of the Annenberg School of Communications at the University of Southern California made a presentation that drew heavily from his 1986 book, The Control Revolution: Technological and Economic Origins of the Information Society.

"In order to understand the social impact of computer use," Beniger advised, "it is useful to concentrate not on computer use as an abstract category but on what those adopting computers intend to use them for....Be on the lookout for who is attempting to control what."

Beniger suggested that analysts move away from general categories such as "computers" and focus instead on such concepts as "information processing" (to change information from one form to another); "communication" (purposive movement of information from one place to another); "decision" (to use informational inputs to affect output that affects behavior in some way) and "control" (purposive influence, however slight, toward some predetermined goal).

Such categories help identify the power relationships and social context within which information technologies operate -- a major theme of Beniger's book. The Control Revolution argues that all the innovations in information technologies -- from photography and telegraphy in the 1830s to digitalized processing and communications in our own time -- can be understood, fundamentally, as responses to "the control crisis of industrial society." The technologies were attempts, assisted by formal bureaucracy, to manage an increasingly complex system of manufacturing and transportation.

In a sense, Beniger continued, computers can be understood as a technological embodiment of bureaucracy, the 5,000-year-old system of human organization for controlling a given realm of the economy. "New forms of information processing technology begin with attempts to control the material economy," he explained.

This control seeks to govern four primary realms of the economy: production (e.g., CAB/CAM, robotics, inventory control); distribution (air traffic control, uniform product codes); consumption (new mass media for advertising, "personalized" mass advertising assisted by computers, market research); and generalized or high-order control (replacement of bureaucracy by computers).

Whatever their intended goals, computer technologies can also produce unintended social consequences that merit our attention, said Beniger. Two examples come to mind:

1) Technologies that originally emerge to control the material economy are eventually seen as useful for controlling anything, including our fellow human beings. (E.g., computerized police records used to buttress apartheid in South Africa.)

2) Technologies adopted to increase control result in ever-more fragile systems that actually increase the risk of losing control. This stimulates the need for higher-order, ancillary control technologies to control the primary control technologies. (E.g., the air traffic control system which governs aircraft, or the nuclear command computer system which governs nuclear missiles.)

Charles Zraket, President and CEO of the MITRE Corporation and the chief designer of the two computer systems in Beniger's second example, disagreed that "control" is the most salient feature of new information technologies. "The 'what is known' as a result of these technologies is the real revolution," asserted Zraket, "not how they're applied, in terms of who gets information and who controls what."

For example, said Zraket, worldwide sensors in space, in the air and on the ground can generate entirely new ensembles of information that could never be obtained before. Computer-assisted advances in astronomy have vastly increased our knowledge of the universe. Zraket added, "Universal interactive access to this information via computer/communications networks, as noted by the late Ithiel Poole of M.I.T., is the hallmark of this revolution in what is known, compared to the invention of the book, the printing press, and broadcast and film media."

Richard W. Judy, Director of the Center for Soviet and East European Studies at the Hudson Institute, agreed that it is "hard to think about computer systems without thinking about

'control.' Yet at the same time [the concept of 'control'] seems so general that it's not productive of any useful propositions."

Judy noted that at a primary level of applications, new information technologies may indeed serve to enhance "control," in the form of new efficiencies and feasibilities ranging from manufacturing to research. Yet there are other applications where "control" is a secondary or peripheral concern.

Information technologies are better viewed as "agents of change" than control, argued Paul Spindel, President of the Scarsdale Systems Group, a management consulting firm. (Spindel accompanied the USIA information technologies tour in 1988.) Selling or giving computers to the Soviets will not provide the ultimate tool by which Soviet leaders control their people, he said. It will instead provide a means (in addition to economic and political factors) for facilitating change.

In trying to identify the sources of technology-related social change, Gary Chapman, Executive Director of Computer Professionals for Social Responsibility, cautioned against "technological determinism." "I continue to be resistant to the idea that technology makes things happen on its own. Whatever is happening is based in human needs, and that need has a source in material circumstances." In the context of East-West relations, Chapman warned, it is especially dangerous to conceive of computers as autonomous agents of social change because such an approach can lead to fatalism.

Wilson P. Dizard, Senior Fellow at Georgetown University's Center for Strategic and International Studies, noted that the rapid development and application of new technologies in the late 20th century make it particularly difficult for us to understand their significance.

Applying our knowledge of computerization to Soviet society is even more difficult, said Dizard, because there are "tremendous discontinuities in the organization and application of information" between our two countries. Furthermore, understanding how new technologies interact with humans is highly problematic, said Dizard, citing Shoshana Zuboff's recent book, In the Age of the Smart Machine: The Future of Work and Power, and the MITRE Corporation's mixed success with introducing computers in schools over the past 20 years.

Computers and Soviet Society: A First Impression

The choice between technological determinism and the politics of human control may be too stark a framework for understanding what impact computers actually have, warned Sherry Turkle, a sociologist at the M.I.T. Program in Science, Technology and Society.

Turkle cited her experience in a Soviet store where a woman at the check-out counter tallied her bill with an abacus. "Will that woman be using an electronic wand on products within the next five or ten years?" Turkle reflected. "Different feelings, assumptions and expectations about the kind of world one lives in are embedded in a change from abacus to electronic wands." Technologies change the way people think about themselves and the world. With computerization comes the growth of a "computer culture." Computer cultures challenge any sharp divide between technological determinists and intentionist control. At the level of computer culture, said Turkle, "it does make sense to talk about the technology itself having some kind of effect."

In response, Gary Chapman took pleasure in citing an aphorism by Karl Marx, "Men make history, but they don't make it as they please." Perhaps it would be useful to consider the dialectical process, said Chapman, and look at the "relationship between the technological infrastructure and human need," and how "those two interact with each other to create some new form of consciousness and some new perspectives on opportunities for technology."

It may be also useful to keep in mind the "law of the suppression of radical potential," an axiom posited by Brian Winston, said Robert Karl Manoff, Director of the Center for War, Peace and the News Media. This socio-political "law" asserts that technologies are developed to the point where they could have a radical impact long before they are in fact employed in such a fashion (if they ever are). This is because the established powers of a society deliberately suppress the technologies' radical potential.

The Soviet Union is probably one of the only societies where this law is actually on the books. A Soviet coop, for example, cannot operate a new photocopier until it first installs the machine in a separate room containing barred windows, a metal door, and a pass-through slot in the door, among other security protections. (Whether such rules are observed in practice may be another matter entirely.) What

makes the Soviet Union so interesting at this time, said Manoff, is that its leaders are self-consciously trying to overcome the law of the suppression of radical potential.

That point deserves underscoring, said Professor Robert W. Campbell of the Russian and Eastern European Institute at Indiana University. As an analyst of Soviet affairs, Campbell said he must frequently grapple with such questions as "What is autonomous? What is exogenous? What sort of causality is operating? In the grand Marxian dynamic, technology is the exogenous factor. But we all agree that there are a lot of surprising results and potentials that come from new technologies."

"For technology to have power, you have to possess it," said Charles Zraket of the MITRE Corporation. "That's one of the things the Soviet Union lacks today. To that extent, it has to be a willful act to possess it."

But assume that the Soviets have identified a need and obtained a technology, interjected Michael Rice. "At that point, is there a kind of determining influence that comes simply from what the machine is capable of doing? Doesn't that 'determine' at least the limits of what you can do with it?"

Not necessarily, replied Sherry Turkle. "In the case of computer technology, you're faced with an extraordinarily ambivalent object. That is to say, it's the best technology in the world for centralization and controlling things, and it's the best technology in the world for radical decentralizing possibilities."

It is important to remember, said Charles Zraket of the MITRE Corporation, that "you can't just look at [the impact of computers] as a cybernetic system. There are lots of humans involved in applying the technology."

"That's where the ambivalence comes in," said Turkle. "People with different motives, desires and purposes seize on the computer and say, 'Aha, this is what I've been waiting for!' But the people in a position to make such a comment probably wouldn't want to be at the same party together."

"I don't think technologists envision what is going to happen at the time they develop new technologies, much as Gutenberg didn't envision the Reformation when he developed the printing press," pointed out Paul Spindel, President of the Scarsdale Systems Group, a management consulting firm. (Spindel accompanied the USIA information technologies tour in 1988.)

Whether a new technology results in centralization or decentralization "is more a political issue than one having to do with the technology itself," claimed Charles Zraket. "The concept of information sharing is what characterizes the current situation." The digitalization of print, film, video and information technologies makes it more feasible than ever to share information worldwide, said Zraket. That, in fact, is the most noteworthy trend in the dissemination of information technologies, he said. "It's the nature of information as a resource that it's going to be shared. I don't think it [the technology] contributes anything to centralization; in fact, I think it pushes things in the opposite direction."

"The technologization of information simultaneously contributes to the rationalization of information and its impoverishment," noted Robert Manoff. "What strikes me about the development of data banks is that information which doesn't get into those systems is lost."

To take the realm of commercial videocassettes, for example, Manoff said that the new technologies ignore "the Girl Scout camp songs, oral traditions, a vast literature, dances, songs, and rituals, not to mention all the marginal publications that don't get on NEXIS. There is sharing -- absolutely. But there is also a narrowing down of what is available to be shared, which is a very serious consequence of information technologies which seem both to expand and narrow one's choices."

"I don't see how you can say that when you can store the Encyclopaedia Britannica on one side of an optical disc," replied Zraket. "The amount of information being shared is increasing exponentially."

"I think we can all put away the idea of simple technological determinism," said Richard Judy of the Hudson Institute. "But what happens when you have two very different information cultures, irrespective of the information technologies in each, and then you make available to the two cultures the same technologies? You may have very different results."

"In our culture, we have a certain compulsion to communicate horizontally," Judy continued. "We think nothing of picking up the phone and calling across the country. In the Soviet Union, that type of culture does not exist. They aren't used to horizontal linkages....Most Soviet research organizations require the permission of somebody upstairs not just to use the Xerox machine but also to make a long-distance call,"

Judy said. (Indeed, a Soviet researcher may need permission to obtain the telephone number to call!)

Judy said that Robert Campbell's research shows that communication linkages in the Soviet Union tend to be along vertical channels, i.e., up and down a bureaucratic hierarchy. This pattern is "not just because of the technology and it's not only because of the politics. The culture expects that that's the way communications occur," said Judy.

Dr. Harley Balzer, Director of the Russian Area Studies Program at Georgetown University, agreed that cultural expectations play a much-overlooked role, but added that the horizontal/vertical distinction is too simple. "In both societies, you've got 'pockets' of both kinds of communications. We've got far more of the horizontal. They may have a predominance of vertical, but the number of horizontals seems to be increasing," said Balzer, citing the flourishing networks of Soviet jazz afficionados and youth newspapers operating independently of Moscow.

One should not discount the genuine differences in "technological literacy" between the U.S.S.R and the U.S.A., warned Glenn Schweitzer, Director of Soviet and East European Affairs at the National Academy of Science/National Research Council. "New technologies are being 'parachuted' into the Soviet Union without the intermediate steps of technological development," said Schweitzer. "There are examples of institutes where people had free access to Xerox machines and they did not know how to operate them. They tried to fix a paper jam and broke the machine." Soviet literacy about technology in 1989 compares to U.S. literacy many years ago, said Schweitzer.

One premise of this discussion, said Nicholas Ulanov, Associate at McKinsey & Company, is that there is a suppressed demand for "horizontal" communications in the Soviet Union. To a degree, demand is restricted because of telephone costs and access limitations, conceded Ulanov. But he wondered if there is indeed "an inevitably superior demand [for telephone use] that will drive down the costs, ease innovation and increase its acceptance among the populace? Or is that neutral? I don't think there's an automatic answer to that question....Culture is a good way to look at it, but you also have to remember that technology helps define the culture."

Catherine Fitzpatrick, Research Director of Helsinki Watch, replied that "demand" has been (and will be) less influential in enhancing "horizontal" telephone communications than the political decisions by Soviet leaders.

Sharing of information may occur in the context of computerized management systems, said Fitzpatrick, but when computers are used as instruments to control people, information is not typically shared; it is withheld. Examples include police files on individuals or the suppression of news about the Chernobyl nuclear disaster or the Armenian earthquake. Furthermore, said Fitzpatrick, the use of computers can result in the "loss" of information through pre-processing -- i.e., the information is never entered into the system in the first place, a phenomenon noted earlier by Robert Manoff.

There may be political or other systematic reasons why information readily available on computers is not disseminated, Fitzpatrick said. For example, a Washington Post reporter told her that the newspaper had incriminating information about Ferdinand Marcos and Oliver North several months before the Post went public with the revelations. "Somehow, no one ever focussed on [the information] and decided to put it on the front page. 'These stories exist in computers,' as the reporter described it....Someone could have pushed a button and printed out the Marcos file. Well, why didn't they? For me, it's more a question of how decisions work than whether computers aid the process [of disseminating information]."

II. COMPUTERS AS DECENTRALIZING FORCES?

Does the growing use of microcomputers and computer networks constitute a decentralizing force in the decision-making structures of large organizations?

To understand what sort of impact microcomputers have had in state and local governments in the United States, Professor Kenneth L. Kraemer, Director of the Public Policy Research Organization at the University of California, Irvine, began this session by providing an overview of his research. Kraemer and his associates have conducted extensive empirical research on computer use in 400 city goverments, including in-depth case studies of 50 of those cities.

Based on his work, Kraemer believes, "There's nothing really radically different going on in these organizations because of personal computers. They're useful tools, sometimes used well, sometimes badly....But there is no decentralization of decisionmaking going on. People are essentially doing what they did before, but they do it easier, faster, or more convincingly."

In the 1970s, plentiful federal revenues to cities were used to build huge databases and computer simulation models for city planning. In the 1980s, federal monies have dried up and city planning now focuses on citizen participation and local decisionmaking; data-intensive, top-down city planning is far less common. "If you want to know about the future impact of computers," Kraemer advised, "you have to look more broadly at the social, institutional, professional changes that are taking place, and try to divine how computers might fit into that context, not change it."

While there are about 10 million PCs in the United States, the number of PCs within any organization is generally quite small -- on the order of several hundred. Most PCs are used for word-processing, spreadsheet analysis, and databases, said Kraemer. About half of business PCs are connected to mainframes, usually for office automation purposes, some for local area networks.

Computer technology is still being absorbed in city government, Kraemer reported; its use is not as widespread as imagined. Furthermore, although some people have greater access to computers than before, the distribution of PCs closely parallels the previous distribution of mainframe resources. In city governments, the main departments using PCs are (in order of usage) data-processing offices, finance and budget offices, police departments, and public works. These trends are likely to continue, said Kraemer, because all his mainframe studies have shown that computerization "tends to follow the dominant interests of power and resources" in a given organization.

"Computing is, for the most part, a tool for doing what people did before, only faster, better and easier," Kraemer noted. "Most people stay within their existing job scope; there is no great pulling up or down of authority [because of PC use]."

While computers can facilitate either vertical or horizontal communication in an organizational hierarchy, Kraemer finds that they are most often used for vertical communication. "People at the top want to get the word out, and people at the bottom want to influence the people at the top," he explained. By contrast, horizontal communication among peers tends to be for less important matters, such as arranging meeting times, coordinating simple tasks, transmitting small work packages, and gossiping. Competing units within an organization do not share information to any greater extent than they shared before, he said.

Kraemer's message, in sum, is that computers usually do not exert the kinds of dramatic effects on organizations that many people expect. He offered several broad conclusions from his studies of "plain vanilla applications" of computers:

- The impact of computers has been marginal, incremental and evolutionary, and it is going to remain so. One reason is that the introduction of new technology -- simply the physical deployment of it -- takes time.

- Developing expertise among end-users of computers takes time, a process that is periodically disrupted by new generations of technology, new operating systems and new vendors. This can set back a data-processing shop two to four years, on average. Managers within organizations are therefore eager to adopt new computer technologies at a pace they can handle. That way, by ensuring internal stability within their organizations, they can better handle the instability that buffets their organizations from without.

- Computer and information technologies do not necessarily alter existing lines of authority. Kraemer cited the experience of the U.S. Department of Health, Education and Welfare's "social services integration" project in the 1970s. The innovation sought to use computers to consolidate the providing of social services, allocate regional resources more efficiently, and provide information referrals. The project was instigated to streamline services and eliminate duplication. In a modest-sized city, for example, there were as many as 150 service agencies with overlapping and confusing jurisdictions.

Once agencies participating in the project saw that the federal government was serious about consolidating not only federal but local resources -- threatening their decisionmaking power -- they pulled out of the program. This is likely to happen whenever computers are used to realign existing configurations of power, said Kraemer.

"Computing is essentially conservative in its application," Kraemer believes. "It tends to serve the interests and agendas of existing organizations and elites. If their agenda is to liberalize and democratize the organization, then information technology can be used to facilitate such reforms. If not, it can be used for other purposes. It can reinforce and perhaps even accelerate change, but it cannot bring change about in the first place."

Based on the U.S. experience, Kraemer concludes, "It is unrealistic to expect that PCs will have a major impact on the Soviet population as a whole, or any significant proportion of the population that exists outside of existing institutions and organizations."

Will Computers Tend to Centralize or Decentralize Authority?

Loren Graham, an historian of science at the M.I.T./ Harvard Russian Research Center, challenged the relevance of Kraemer's research to Soviet society: "Since the spreadsheet itself has built into it the assumptions of our existing economic order, it's totally unsurprising that when you ask what will be the effect, the answer is that the effect will be incremental. The spreadsheet was built on that assumption. It's an enabling technology for the goals already assumed by our society.

"But if you put that same technology in a different society with different rules and perhaps even different goals, then the answer becomes very different....Under the traditional Soviet economy, the spreadsheet doesn't make sense," Graham asserted.

To illustrate his point, Graham cited a well-known essay by historian Kenneth White which argues that the introduction of the horse stirrup in 10th century France led to the birth of European feudalism. "But what White didn't mention," said Graham, "was that the horse stirrup was invented in China in the 6th or 7th century, slowly made its way across Eurasia and Europe, and bang, suddenly it had an effect." France was already on the way to feudalism, explained Graham; the horse stirrup was simply an enabling technology. The computer, too, is an enabling technology whose impact depends upon the host culture.

Nicholas Ulanov of McKinsey & Company urged participants to look at what exactly information technologies enable. "While the Soviets may import computer technology for certain uses, it may so readily enable other uses that it helps to transform the culture into which it is introduced," said Ulanov. To illustrate his point, he cited numerous instances in which major corporations have used computers to transform entire sectors of the U.S. economy: oil refining (Texaco), air transportation (American Airlines), hospital supply (McKessan), as well as most newspapers and finance services.

Richard Judy also questioned the relevance of Kraemer's

research to the Soviet Union, because it focuses on large-scale, public-sector organizations, which are the least likely to use computers in innovative ways. One should look instead at new, small-scale, entrepreneurial, quasi-private organizations, said Judy. From his review of actual orders for computers at the Soviet Ministry of Electronics, Judy said that "the preponderance of people seeking to buy computers are in coops." Why are cooperatives interested in computers? Perhaps to produce software, Judy speculated, because that averts the need for supply inputs from the outside, which could be very unreliable.

It may be more useful to ask whether computers will drive administrative change rather than administrative reform, said Glenn Schweitzer, Director of Soviet and East European Affairs at the National Academy of Sciences/National Research Council. Reform may or may not occur; change will almost certainly occur in at least two sectors: Soviet program budgeting, which is using computers to draw in more participants, and computerized management information systems, which can force managers to think through problems they might otherwise pass over.

Since micro-computerization is at such an early stage in the Soviet Union, said Dr. Murray Feshbach, Research Professor in the Department of Demography at Georgetown University, it may be premature to make predictions. Two years ago, for example, only 1.6% of students in the ninth through twelfth grades actually had access to a computer even though nearly all of them were required to take computer courses. Given the nascent stages of computerization and political liberalization, Feshbach called it "wishful thinking" to postulate one or another social impact right now.

Returning to the question at hand -- Will computer technologies tend to promote decentralization or centralization of authority? -- Leonard R. Sussman, Senior Scholar in International Communications at Freedom House, an organization that monitors human rights, is optimistic. He believes "the potential for a Hegelian synthesis, resulting in a higher and higher level of decentralization, is there. I don't think the Soviets have a choice at this point." For the moment, what is noteworthy, said Sussman, is that "the periphery [of the Soviet citizenry] is speaking to the periphery," as seen in the diverse citizen-contributors to glasnost magazine. The Communist Party may be destined to have only "a central impact rather than central control," he said.

In considering the question of centralizing/decentralizing impact, Charles Zraket urged that participants make a distinction "between what happens within an organization that

builds and operates a computer system, and the impact that that organization has on the outside world." The organization of information within an organization can be very decentralized in operation, but its impact on the outside world can be very centralized, said Zraket, citing his work in designing computer systems for the Internal Revenue Service, the F.B.I.'s National Crime Information Center, the State Department, and the Department of Defense.

Furthermore, decentralized communications does not necessarily imply decentralized control, Zraket pointed out. Within large, professional research organizations such as the MITRE Corporation, he said, communications can be quite decentralized among researchers even while policy control remains quite centralized among top management.

Goodman's Historical Review of Soviet Computerization

Dr. Seymour E. Goodman, an expert on Soviet science and technology and Professor of Management Information Systems and Policy at the University of Arizona, also bridled at the centralization/decentralization dichotomy. The model for Soviet mainframe computerization has been one of "distributed hierarchy," in which Moscow has sought to strengthen its centralized authority via computers while leaving local enterprises with some limited autonomy.

In a major computerization drive conducted over the past 20 years, the Soviets introduced thousands of mainframe computers into enterprises throughout the U.S.S.R. Despite intensive investment and Party commitment, the effort has essentially failed.

Why? "Computing, for whatever it enables, exists in a much larger web of organizations," explained Goodman. The nature of this "web" has a lot to do with whether computerization can succeed or not. A Soviet factory must interact not only with its normal production suppliers and customers, but also computer and software suppliers, maintenance workers, and often, the local Communist Party leadership. The relationships among these groups are not conducive to computerization, to put it mildly, Goodman reported.

"In terms of base technical support, the people who use computers in a Soviet enterprise are in deep trouble," he said, because of the unreliable supplies of spare parts, electrical power, floppy discs, paper -- everything you can think of! Nothing is too small to throw a monkey wrench into the basic computing capability," Goodman stressed.

In this context, questions of centralized or decentralized authority are not as germane as the mere ability of a Soviet enterprise to run a reliable computer operation. If spare computer parts can take two years to arrive and the local Party officials are clamoring for greater output, the typical factory manager is not eager to make his enterprise more dependent on computers, said Goodman.

"No one really quite knows how to run a modern high-tech organization in the Soviet Union; neither Marx nor Lenin told them how to do it," he said. It is impossible to run a squeaky clean enterprise because so much gray-market dealing and creative accounting is needed simply to function in the Soviet economy.

Given these norms of economic life, a computer creates more problems than it solves for the typical Soviet enterprise. Either you use the computer to run a fictional "virtual company," in which case the computer becomes an extra burden, or you try to use it as a useful, Western-style management tool, creating "an audit trail that never existed before," said Goodman. For many reasons, "there's a great disincentive to using these machines," he said, even with perestroika.

The portrait of Soviet computerization is far different when it comes to the military and research and development efforts, said Charles Zraket. The Soviets are quite advanced in the cognitive sciences and computer design, even if their technological artifacts are not as good as ours; their mathematical algorithms are sophisticated and can compensate somewhat for hardware deficiencies; they understand communications theory; and they can exercise great control over their nuclear weapons via communications links. In describing Soviet military computers and communications, Zraket used words like "effective," "impressive," and "reliable, survivable and robust."

III. A PORTRAIT OF SOVIET COMPUTER AND INFORMATION TECHNOLOGIES

What are the noteworthy aspects of computing and telecommunications in Soviet society today?

In this session, Dr. Seymour E. Goodman elaborated on the portrait of Soviet computing that he sketched earlier. He referred participants interested in technical detail to a recent report, Global Trends in Computer Technology and Their Impact on Export Control, published by the National Academy Press in 1988. A lengthy chapter by William McHenry provides the most detailed,

up-to-date assessment of Soviet computerization publicly available.

Goodman reported that there are four noteworthy areas to explore: the Soviets' new rhetorical emphasis on computers, bureaucratic reorganization to foster computer use, technology transfer efforts, and development of new computing and telecommunications hardware.

1) In the past several years, there has been "an intensification of rhetoric relating to computers," said Goodman. "Computers are a 'centerpiece technology' in perestroika. ..In fact, perestroika is to some extent driven by a Soviet perception that they are in deep trouble, in terms of technological innovation and diffusion. No technology has a higher profile in making the Soviets aware of these problems than information technologies." So far, however, the increased volume of "computer rhetoric" has had little substantive impact.

2) One major Soviet strategy for dealing with its computerization problems has been to create new bureaucratic organizations, such as multidisciplinary scientific/technical complexes, new state committees, and new cooperatives. Despite the changes, "few if any of these organizations have dramatically improved the bottom-line situation, and some of them are falling apart," reported Goodman.

3) Technology transfer remains a key Soviet strategy for improving the nation's computer capabilities. While technology transfer efforts resemble those of the detente period in the 1970s, today's technology transfer has both "a different character and new prominence," said Goodman. "There is a new awareness of what's going on globally."

4) Soviet development of new computing and telecommunications hardware has been modest and evolutionary over the past few years, especially compared to global computer developments. There has been a sequence of unimpressive machines and an interest in melding telecommunications and computers and in developing local area networks, Goodman reported. But the distribution of any new technology is so slow that it diminishes the importance of new technical developments.

To put the Soviet computer situation into a global context, Goodman related it to three worldwide trends in computing: globalization, commoditization, and a broadening technological spectrum. In each of these areas, the Soviets have "missed the boat," said Goodman.

The globalization of computers has been "one of the most extraordinary dispersions of technology in the history of technology," said Goodman. "Any nation that has any claims or aspirations to be modern must find a place for itself with these technologies." It's not just a matter of acquiring machine x; the technologies are "working their way into the fiber of important sectors of these nations' economies."

Soviet physical scientists and Party leaders concerned about their nation's world image are not happy to be left standing on the sidelines, said Goodman. The disappointment is especially acute because the Soviets were pioneers in much of the technology and are now being outperformed by many minor countries such as Taiwan and South Korea (and even more annoying, by its long-time rival, China).

"Commoditization" -- the transformation of exotic technologies barely out of the lab into mass-produced items of international commerce -- is another area where the Soviets have fallen down. They are still struggling to produce tens of thousands of eight-bit microcomputers, which don't have adequate memory capacity, monitors or hard disks. The only technology that is being commoditized in any volume is telephones, part of a major Soviet effort to make them widely available.

A "broadening technological spectrum" -- the filling in of product "holes" in the multi-dimensional spectrum of information technologies -- is another major global trend in computing. New products with more specific uses are constantly being created; old products are being given broader uses and made more accessible. A key example is high-speed computing, once a capability sold by only one company to major institutional users. Now there are dozens of machines produced that have some claim to super-computing performance in one domain or another (a fact that greatly complicates technology transfer policy).

Here, again, the Soviets are failing, except perhaps in the area of high-speed computing. Even here, Soviet computing is largely in the 1 to 5 MIPS range, which is not high-speed computing by world standards.

The Soviets, especially the military, are intensive users of sophisticated satellite communications, said Charles Zraket of the MITRE Corporation. As the military upgrades its satellite technology from C-band to Ku-band (a more powerful part of the spectrum), it may turn more of its old technology over to the civilian economy. While ground-based telecommunications may be lagging, the infrastructure of point-to-point satellite telecommunications is "robust," said Zraket.

Soviet Telecommunications

Professor Robert W. Campbell of Indiana University said that the Soviet telecommunications system, as a point-to-point switched system for transmitting data, voice, facsimile documents, etc., is "utterly inadequate to the needs of a modern industrial society." It's "too thin," for one thing, in terms of the numbers of households and businesses served. The United States has some 180 million telephones; the U.S.S.R. has about 30 million.

Second, the Soviet telecommunications system is not well-integrated. "Its architecture is strange in that it does not accomplish what should be the main goal of a telephone system -- to put everybody in touch with everybody else in a short interactive cycle."

The Soviet leadership has become aware of its telecommunications deficiencies and is trying to improve things, as part of its drive to "informatize" Soviet society. Many of the chronic problems in the system stem from the low status that the telecommunications sector has in the Soviet economy. To obtain equipment, it must rely on the military/industrial establishment, which is not responsive to civilian needs, and on imports from Eastern Europe. The Soviets' indigenous capabilities for producing civilian telecommunications are "very, very weak," said Campbell.

In revamping their telecommunications system, the Soviets must also find ways to give greater priority to the needs of the civilian population and production enterprises, and not just the needs or wants of the Party hierarchy.

Could new information technologies serve as an autonomous force for social change in the Soviet Union? Campbell doubts it, explaining: "Technologies are carefully shaped to fit the imperatives of an existing organization. On the other hand, if you want to democratize [Soviet institutions], all these communications technologies could be very important" -- something that is perhaps evident in Gorbachev's many policy changes.

Despite obvious problems in Soviet telecommunications, we should remember, said Wilson P. Dizard of the Center for Strategic and International Studies, that the Soviets are the second-largest producer of telecommunications equipment in the world. Furthermore, they are starting to import very good Finnish equipment; they recently struck a major deal to import Spanish telephone equipment; and they are now negotiating with Alcatel, the French company, to acquire equipment. Big changes are underway.

Despite these developments, importing telecommunications equipment is not Gorbachev's top priority, said Charles Zraket. He really wants to build "the downstream infrastructure that will allow the Soviets to build the equipment themselves rather than import it," he noted. "But that's a much more complicated technology transfer problem, because you're not going to get [foreign companies] to go into joint ventures without a revolution in how the Soviet market system works."

Are the Soviets Capable of Producing High-Tech Equipment?

If the Soviets are to develop an indigenous computer and telecommunications capability, they will need to radically change the structure of their economy, predicted Richard W. Judy of the Hudson Institute.

"The problems of the supply system are really quite incredible," said Judy, "because any given producer has to have inputs from a large number of suppliers, each of which is a semi-monopolist who doesn't care about producers. And so the system falls down." Judy provided the group with a case study of the Soviets' abysmal failure at manufacturing the Korvet, a fairly basic educational computer workstation.

Judy continued: "The Soviet [supply] system worked reasonably well when the kind of goods produced were reasonably simple and didn't require fine tolerances or inputs from a large number of sources." Furthermore, the military can generally obtain high-quality products because it is "an informed, empowered customer." But the civilian economy is not empowered, said Judy, "so there's no discipline of the market."

"They realize they have to change the essence of the system and open it up to the rest of the world," said Judy. "But trying to pull that off is a very difficult job. Look at the history of reform in Eastern Europe and China. It makes you wonder if it can ever be done in the state sector. Or do you have to build around it with new kinds of entities, private or cooperative, where the market feedback mechanism can work?"

Alice H. Henkin, Director of the Aspen Institute's Program on Justice and Society, asked if ideology is hobbling the advance of Soviet technology. Professor Loren Graham, the historian of Soviet science and technology, replied that ideology did have an inhibiting effect until Gorbachev came to power, but "for now they've faced that issue and dealt with it." The main impediments to technological advance are not ideological, said Graham, but "economic and systemic."

The nation whose technological advance is most hobbled by ideology, said Graham, may just be the United States. "We are still completely hung up on the issue of technology transfer [of computers and telecommunications] to the Soviet Union when, in terms of international competition, the Soviets are zilch on the scale." Meanwhile, the Japanese and others are using our technology to enhance their competitive position in the world economy, he said. "We find ourselves incapable -- I think for ideological reasons -- of defining our national security in economic terms, and not just military terms."

Charles Zraket speculated that when it comes to producing cutting-edge information technologies, the Soviets' chief handicap may be cultural -- just as the Japanese seem to enjoy a "cultural" advantage in their superiority in high-tech industries.

Catherine Fitzpatrick of Helsinki Watch suspects that the roots of poor production quality may lie in a psychology and sociology of "crime" in the Soviet Union. "When you take the population and make their natural impulses and ways of getting things done quickly <u>crimes</u>, it has an insidious influence on people's consciousness. They are used to the devious approach, rather than doing things straight-forwardly," said Fitzpatrick. "Crime becomes a form of autonomy -- a way to distinguish yourself from the system. That breeds a kind of malice if you're at the low end of the workplace," which can result in poor workmanship.

But isn't there a contradiction here? Michael Rice interjected. If the underlying cultural characteristics of the Soviet people are so much to blame for the Soviets' laggard technological progress, why then is military technology so superior? Might this disparity refute any "cultural" explanations?

Professor Goodman of the University of Arizona replied that production quality is a problem in both the civilian and military sectors. The military achieves higher performance through more exacting quality control and by skimming the highest-quality units from production runs. Also, military hardware can be improved through a few key links with the outside world; producing massive numbers of microcomputers for the civilian economy is a different sort of challenge.

IV. DOES COMPUTERIZATION REQUIRE AN OPEN SOCIETY?

Is a more open society the necessary precondition to Soviet achievement of the efficiencies and advances that computer-based technologies can make possible?

Loren Graham of the M.I.T./Harvard Russian Research Center opened this session by offering his thoughts on this question. After noting the remarkable liberalization of Soviet political and intellectual life over the past five years, Graham is led to conclude, "No longer is censorship a major impediment to computerization. Other factors are." Chief among these other factors are economic backwardness, cultural attitudes, and the bureaucratic tradition, he said.

Graham put forth the provocative hypothesis that the economies of the Soviet Union and the United States may become more alike than different within twenty or thirty years. Both may be plagued by "common diseases," which Graham identified as "a greater desire to lead a comfortable, intellectually stimulating life rather than a practical, productive and profitable one," and an overemphasis on theoretical studies, short-term financial outcomes, and non-productive activities with a corresponding underemphasis on manufacturing, long-term management strategies and education.

Graham concurs with Seymour Goodman that Soviet society will see new "islands of information in a society which still restricts information," a trend that will inevitably accelerate as computers spread. "If computers are spreading at the same time that the taboos are falling," said Graham, "what does samizdat mean?" When one participant protested that the Soviet leadership will not surrender its power so easily, Graham replied that "they may be insisting on a prohibition that has no bite."

Dr. Goodman suggested that the censorship model that prevails in Hungary might evolve in the Soviet Union, in which official censors occasionally mount crackdowns on blatantly provocative works but generally stay in the shadows, a "latent force until a boundary is crossed."

Catherine Fitzpatrick agreed. Yes, censorship of a literal, mechanical variety may diminish, yet other, more subtle forms of censorship will remain: stories yanked from official publications, press blackouts, etc.

Murray Feshbach of Georgetown University believes that there will be less censorship in the future, but that the freedom of expression permitted will be uneven. "It will be different in different parts of the country. It will vary by topic, place and person." Leonard Sussman of Freedom House believes that, despite much liberalization, "the volume of censorable material, especially religious and nationalistic material, will increase considerably and be a source of tension."

Toppling old taboos by relaxing censorship does not have permanent results in any case, said Catherine Fitzpatrick. "It's like shooting moving ducks in a gallery -- they keep coming back."

Graham did not dispute that important forms of censorship may persist, but clarified his point: "Censorship is no longer a major reason for the lag of computerization in the Soviet Union. I think in the past it was." If Gorbachev wanted to pick the single most important policy change to unleash computerization, it would not be the elimination of old taboos about controlling information, said Graham. It would be to let the economy go free -- entrepreneurialism, open buyer-seller relationships, etc.

"But freedom of expression has a lot to do with a free economy," countered Nicholas Ulanov. Graham agreed, but again stressed, "Over the past five years, the Soviet Union has gone from a point in which the control of information was a very serious fetter to the computer industry, to a point where it is no longer the most serious fetter."

Professor Campbell of Indiana University noted that the Soviets have recently made a radical shift in priorities with respect to telephones, a technology traditionally regarded with great suspicion. The Soviet leadership now wants to have telephones in 90% of all households by the year 2000. The current five-year plan allocates some 85% of new telephone installation to households, sometimes by taking phone lines away from businesses.

Nicholas Ulanov of McKinsey & Company took issue with those who believe that a relative lack of censorship is enough to stimulate computerization. He cited differences in workers' behavior in the U.S. when an organization has "work group (network) computing" as opposed to stand-alone personal computers. Although the former scenario may encourage greater collaboration, data-sharing, and centralized control, a certain amount of creativity is lost in the process because "people start worrying that what they put into their private,

uncensored E-mail (electronic mail) may get read by somebody else. The data is accessible to people. It doesn't actually have to be read by anybody to affect people's behavior."

If computer networks can stifle openness in relatively benign organizational cultures in the U.S., imagine the impact in the Soviet Union where the KGB is often snooping about, suggested Ulanov. "In order to have a genuinely unfettered technological surge in computing," Ulanov stated, "you don't need just relative openness, you need genuine openness. And we're not talking about a genuinely open Soviet Union."

Unlike censorship of other communications media, computers, once widely dispersed in the Soviet Union, may permanently elude official control, said Wilson P. Dizard of the Center for Strategic and International Studies. He wondered how Soviet leaders could control computers if there were enough computers using electronic telephone switching lines in ten years. "Interactive, unmediated networks may be feasible and the government may not be able to enforce its control of computers," Dizard said.

Zraket pointed out that "there's no network you can build that can't be monitored." Dizard replied that the sheer number of computers would make that less feasible. To which Zraket replied that Soviet authorities could nonetheless target certain people for monitoring.

How Might the Soviets Overcome the Economic Obstacles to Computerization?

Having discussed how censorship may or may not impede computerization, Rice urged the group to assess the economic obstacles and how they might be overcome. Are there stories of computers being used successfully, perhaps in cooperatives?

Since 1983, coops in Hungary have emerged as successful users of computers, reported Richard Judy of the Hudson Institute. The coops import AT computer equipment from the Far East and develop their own software, which they then sell to Hungarian state enterprises and other coops. They earn the hard currency to import PCs through counter-trade of Hungarian commodities such as furniture and folk art. Although the coops suffer a relative disadvantage from the exchange, they compensate for it with domestic sales of their software.

Soviet coops are more likely to sell services than goods, said Paul Spindel, President of Scarsdale Systems Group. "The coops see PCs not so much as a way to provide better services as a way to obtain money through the blackmarket," he said.

For example, a PC brought into the country for $1,000 can be sold for $10,000 on the black market. Such profiteering is a keen motive for most of the 100 coops that he encountered. Such uses of PCs, others dryly noted, are not especially healthy examples of computerization.

Dr. Harley Balzer of Georgetown University said he thinks it unlikely that there will be mass availability of microcomputers in the Soviet Union within ten or even twenty years. The number of units that can be produced through serial production is "astoundingly low" -- in the hundreds, for example. But importing PCs is difficult because of the great competition for use of hard currency.

The Soviets did strike a barter deal with Peru two years ago to produce 100,000 PCs over a five-year period, said Dr. Goodman. But the number of machines produced so far is quite small and their quality mediocre, he said, adding, "This is the other superpower nickle-and-diming their PC problem!"

Do Joint Ventures Hold Promise for Soviet Computerization?

Michael Rice posed the question: Are there steps that the Soviets could take to help them achieve technological advances gradually, without disrupting their existing economic and political fabric?

Nicholas Ulanov said that he once studied over 500 ventures in high-technology electronics between multinational partners between 1980 and 1985. "Four out of five joint ventures failed to meet the criteria that both parties had stated as desirable at the start of the joint venture," he reported, "and many of the remaining one out of five companies simply could not be tracked down."

These results don't mean that one of the parties wasn't very satisfied, but both, at least, were not. Common complaints were that the technology had not been transferred; the production capability did not exist; the resulting enterprise was not profitable; and/or the output did not equal the input.

For all these reasons, Ulanov is skeptical of joint ventures. Why then do companies still enter into such deals? "There are muliple motives," Ulanov explained. "You may say you want a profitable enterprise. But what you really may want is access to the Soviet market. You may think that someday, by having a presence there, it will be worthwhile to be there, even if it doesn't make money now."

Glenn Schweitzer of the National Academy of Sciences/ National Research Council sees little promise for joint ventures in computer production. Among the areas in which such arrangements will be made are health care, construction and food processing, said Schweitzer -- areas in which the results will have visible public impact.

Dr. Murray Feshbach said that most joint ventures with the Soviets have been "fairly unsuccessful" and that the Japanese had had sour experiences with such arrangements. Joint ventures make sense primarily as "long-term, front-end investments for what you think the market will be." Changes are underway, but they will take five or ten years and require Soviet entry into GATT and the IMF, both of which in turn will require price reforms to deal with the Soviet budget deficit.

Feshbach sees the Soviets following the economic model of the Swedes and Norwegians: using the word socialism but allowing private enterprise and using coops sensibly. One portent of this likelihood, he said, is Gorbachev's explicit, approving references to the Swedish and Norwegian models in his January 6, 1989, speech to academicians and cultural leaders. Also, Feshbach reported that in January 1989, there were five Soviet deputy ministers of different ministries and 20 senior aides visiting Sweden to learn more about the Swedish experience.

In assessing the promise of perestroika, Professor Campbell urged the more realistic perspective provided by history. "There is no way that joint ventures or coops, even if given great latitude, will transform the Soviet Union," Campbell contended. Innovations in those sectors "will work only in small parts of the economy that do not jostle the state economy and aren't big enough to attract the attention of the bureaucrats, etc. If you're going to make an enclave that's going to transform the economy, it has to be big and have a base. You can't just get a few entrepreneurs out of the woodwork to form cooperatives and a few foreign companies with a long-term view." Campbell said that the Chinese model, of bringing in foreigners to operate entire facilities, holds the best short-term hope for the Soviet Union.

Even innovations tested in limited territorial or sectoral settings may not be big enough, Professor Campbell added. Remember, it has taken Hungary twenty years to reform its economy, and it still has serious fiscal, tax, and property rights problems to resolve. It will take at least that long for the Soviets to make significant progress.

For the foreseeable future, business success in the Soviet Union will go only to those "individuals who beat their heads against walls, break rules, take chances, and go against restrictions," said Dr. Harley Balzer of Georgetown University.

Despite such grim forecasts, participants noted that the perestroika reforms place grand expectations on computers. In light of how computers have not lived up to such expectations in the U.S., particularly in education, Professor Sherry Turkle of M.I.T. suggested that "our myths about what computers can do are catching!" Based on her study of computers in American education, Turkle expressed doubts that computerization in the schools will do much for the Soviets. It may even make them less able to come to terms with the emerging computer world of parallel processing.

Dr. Seymour Goodman, the scholar of Soviet technological progress, agrees that computers in Soviet education are not likely to accomplish much. "But put yourself in their shoes. You've got limited resources. You want to do something that will have high profile that may have some substantive impact for the future. You look for something with relatively low risk. It is easier, after all, to put computers in schools than to build 32-bit microprocessors." So the great campaign for Soviet computerization has fallen to the schools "almost by default," said Goodman, adding, "We're talking about a desperate situation here."

"Soviet society has always had to have an ideology of technological transcendence," explained Dr. Harley Balzer. "Every five or ten years, there's been some technology [held out as a salvation] that will allow them to leapfrog over the problems of backwardness and catch up with the West. Every single time, it's been a disappointment."

V. SOVIET COMPUTER CULTURE AS A REFORMIST VANGUARD?

Is there evidence of a growing computer culture in the Soviet Union (or other Eastern-bloc countries) that can promote or benefit from glasnost and perestroika?

Catherine Fitzpatrick of Helsinki Watch opened this session by telling of the role computers and other information technologies now play in the samizdat community, who comprise one segment of the Soviet computer culture.

"People have PCs; they use them; they work their tiny printers to death, using them 24 hours a day," said Fitzpatrick. The source of many computers is Soviet tourists returning home from the West. An estimated 20,000 Soviet citizens travel abroad on tourist visas each year, and 10,000 Soviet emigres return home each year. The magnitude of this commerce in PCs might be suggested by the New York-to-Moscow Pan Am flight, said Dr. Feshbach; the aisles and overhead bins are absolutely glutted with consumer electronics. Soviet customs allows returning tourists to bring in one computer and printer for personal use per visit. (Fitzpatrick said that it is also now possible for samizdat writers to fax documents to many western European cities, which in turn can be faxed to the United States.)

Among the samizdat community, said Fitzpatrick, the computer has taken on another function besides printing, word-processing and memory storage; it also serves as unit of currency on the black market, where one computer can sell for between 30,000 and 50,000 rubles. Why do samizdat publishers want rubles? "To pay typists and to bribe Xeroxers. That's how it works, because these people can no longer get services for free. It's very much a pay-as-you-go situation, partly as a result of the emancipation of females."

It is not illegal to own PCs or fax machines, but Soviet authorities sometimes seize the machines as "evidence" to prove anti-Soviet publishing. Until recently, the relevant part of Soviet law governing such machines was Article 70. This code is now being revised and reissued as Article 98, which clearly forbids "appeals to overthrow or violently change the constitutional order" (an apparent derivation of the U.S. Smith Act!). PCs can be seized under language that prohibits treasonous appeals made "with use of technical means intended for, or capable of, duplication...." The penalty: 10,000 rubles fine and seven years labor camp.

In December 1988, new laws governing cooperatives were passed that ban (among other activities) book publishing, lectures, educational cooperations. Some activities such as editorial production and printing are permissible if they are conducted in conjunction with existing establishments.

Given the new atmosphere of glasnost, the role of the samizdat press has changed, said Fitzpatrick. "It serves to consolidate interest groups and create cohesion among peers and nationality groups," she said. "It resembles the inhouse organ of nonprofits that we're familiar with."

Nonetheless, samizdat publications also exert pressure on the establishment press. "There's a hastiness [in the establishment press] to get things into print and carve out the territory for what an event means, before it gets taken over by the private press," said Fitzpatrick. Or sometimes an event described in the alternative press -- e.g., a human rights abuse -- may be written about in the official press months later. In this sense, the dissident press sets the limits of permissible discourse. As the English-language editor of the Moscow News told Leonard Sussman of Freedom House, "I read Pravda to get the party line; they read me to see how far they can go."

Context is particularly important in what sorts of public expression are permissible, said Fitzpatrick. The Popular Front gives lip service to democratic socialism and obtains permits to hold public meetings, and it is not harassed. But the Democratic Union, which does not observe the same niceties, does get harassed despite very similar public statements.

A Portrait of the Emerging Computer Culture

What about that segment of Soviet computer culture that is not political? asked Michael Rice. Does it exist? How does it function?

At the USIA information technologies tour in 1988, Paul Spindel found three primary groups who were interested in the exhibit: 1) Scientists and engineers who were English-speaking, well-connected, and reasonably informed; 2) Youthful hackers who knew the underground U.S. computer literature; and 3) Women, who comprise 90% of the trainees for computer programming jobs. As a group, the women seemed attentive and curious but submissive, said Spindel.

As far as a "computer culture" among the Soviet public at large, that is still many years away. Of those Soviet citizens who attended the USIA exhibit of fairly basic PCs and related equipment, "80 to 90% thought it was science fiction," said Elizabeth Buxton, who accompanied the tour. In major cities, between 5,000 and 15,000 Soviet citizens lined up to see the exhibit each day.

There is "not much question" that there is a growing computer culture, said Dr. Harley Balzer, citing a "wealth of anecdotal evidence" compiled by S. Frederick Starr. When Balzer brought along copies of the American-published Byte magazine to a Soviet school, the students "pounced" on it with enthusiasm.

Balzer reported that Fred Starr believes the emergence of various computer-oriented groups in the Soviet Union represents a decisive shift in the direction of communications in that society. Balzer himself is more skeptical, and believes any major shifts will be gradual and not uni-directional.

One vibrant computer subculture is growing up around Soviet computer clubs, which are both meeting places for experts and learning places for novices, especially children. The first of these clubs was founded in Moscow by Gary Kasparov. During summers, it sponsors a computer camp. Sherry Turkle described her June 1988 weekend visit to the camp, held in a school on the far outskirts of Moscow.

The organizers of the camp had made an effort to draw from the "two cultures" -- children from the computer club and from a youth organization devoted to nature and camping. The camp alternated activities in archaeology and history with computer access and instruction. The head counselor was a high school history teacher with a special interest in archaeology; computer instruction was provided by mathematicians associated with the Kasparov club, most of them drawn from a network of graduates of Moscow School 67, know for its special program in mathematics.

The 50 campers ranged in age from 8 to 15. Of the campers drawn from the Kasparov club, most seemed to come from elite families -- their fathers were engineers, professors and scientists. The "Kasparov" campers were all male and highly talented. Admission to the club is very selective; for every 30 students who apply, only one is chosen. And they were highly focused in their interests. Although the camp leaders planned a schedule that alternated archaeological digs (helping to excavate a nearby church) with computer activities, the campers' lack of enthusiasm for the first and commitment to the second had turned computer use into an activity that occupies many of the children for most of the day, with the favorite activities being writing programs for computer games, both in BASIC and machine language. The computer room was male-dominated and expert-dominated. Girls were timid about coming in as were boys who were less advanced in their computer skills. (They were trying to get separate hours when they could have the computers to themselves.)

Turkle described an atmosphere of contrast and complexity: A high-tech curriculum and highly charged conversation about Russian nationalism, religion, the importance of spiritual values. Children were hungry for computer expertise as a way to travel more, have access to money, foreigners and free contact with other Soviets.

However interesting the Soviet hacker culture, Alex Beam, a journalist who reported from Moscow for three years for the Boston Globe, believes that it holds little promise for Soviet society in general. Hacker culture "is a thin layer of children from the technocratic elite" and "is not even a major trend," he said. Dr. Balzer agreed, noting that a colleague of his who just wrote a book on Soviet popular culture does not mention hackers at all.

But Paul Spindel pointed out that hacker culture does suggest a certain "intellectual independence," and that is an encouraging development. And Marjorie Mandelstam Balzer, an anthropologist who has studied Soviet cultures, observed that, while hackers are not large in number, they "come from elite backgrounds and may have a greater influence when they grow up."

Glenn Schweitzer of the National Research Council objected that the term "hacker" has implications that don't really exist in the Soviet Union. Young computer buffs are earnest, career-minded individuals, not high-tech renegades of a counterculture movement.

"What can a computer culture do to help perestroika and glasnost?" asked Gary Chapman of Computing Professionals for Social Responsibility. "My answer would be, 'Not much.' What the Soviets really need is a vast transformation in thinking about their politics and economy."

"One myth of the computer culture is that it is necessarily individualistic and entrepreneurial and thus is in a privileged relationship with democratic institutions," said Sherry Turkle. "The Soviet experience is turning this myth into a working hypothesis about the relationship of computer use and political awareness. My current observation in the Soviet Union is that with computer expertise, people feel that they have a stake in the future, know the value of their work, and find lack of access to people, information and markets unnatural. I believe they are an important growing point of civil society."

VI. SHOULD "THE WEST" ENCOURAGE SOVIET COMPUTERIZATION?

How actively should "the West" encourage computer development in "the East"? Should there be an explicit strategic or human-rights tradeoff for offering assistance, forming joint ventures, or loosening high-tech export restrictions?

Since the arrival of glasnost, said Wilson Dizard of the Center for Strategic and International Studies, formulating U.S. policy toward the Soviet Union has become a more complex enterprise. New changes are so rapid.

One initial complexity in answering the session's question, Dizard pointed out, is the precise meaning of "the West," which, besides the United States, includes many different "players" such as the OECD counties and major computer exporters such as Korea, Taiwan and Brazil. "The East," too, is an agglomeration of many nations with different relationships to each other and to "the West."

"A second problem," said Dizard, "is factoring out the 'computer relations' from among the whole tangle of relationships that the U.S. has with the Soviet Union and Eastern Europe. Obviously, computers are important but they're only one piece of the jigsaw puzzle, which includes human rights, trade, and many other factors."

Dizard identified three primary policy approaches toward the Soviet Union these days: 1) Hardliners, personified by Richard Perle, the former Department of Defense official, who believe this is the time to get tough with the Soviet Union. 2) Business interests, who believe the U.S. should actively seek out Soviet trade because it will help ease the U.S. trade deficit. Moreover, if we don't trade with the Soviets, the Japanese, Koreans and others will. 3) Supporters of Gorbachev, who believe that if the U.S. and other nations do not help Gorbachev's reforms succeed, some new era of Stalin-like oppression may replace them. Proponents of this approach even suggest something resembling a Marshall Plan for Eastern Europe.

In a sense, technology transfer is the central issue in this debate because, even in talking about basic computer systems, the key issue is the disparity of technological development between the Soviet Union and the United States.

"We are already encouraging Soviet computer development in a lot of little ways that add up," Dizard pointed out. CoCom itself has been easing some restrictions on computer exports. Also, the Soviets benefit from the osmosis of commercially available U.S. computer goods and publications, even if the flow is sometimes circuitous or informal.

What would be the impact if current restrictions on technology exports to the Soviet Union were loosened? Dizard doubts that "the floodgates would be opened" because the Soviets are somewhat reluctant to become overly dependent upon foreign technology. Also, the Soviets do not have ample supplies of hard currency to spend on foreign computer goods, nor do they have much to sell to the U.S. in return.

Dizard's conclusion: "Computers and other high-tech resources are a small but important part of the overall strategic relationship with the Soviets. There is room for a prudent policy that ties our interests in this area with other factors, such as human rights, conventional force levels in Europe, Soviet policy in Eastern Europe, conventional trade, and participation in GATT down the road. We do have an interest in a more stable, less aggressive Soviet regime."

Robert Karl Manoff of New York University's Center for War, Peace and the News Media, observed that "any position on trade and technology policy is in effect predicated upon internal Soviet political developments." What's been missing from U.S. policy toward the Soviet Union, said Manoff, is an appreciation for the emergence of a civil society in the Soviet Union, with all that implies -- genuine political discourse, a rudimentary electoral process, political factions, etc.

Nor do we have a "sufficiently historical" understanding of how the current balance of forces in the Soviet Union will be altered in the future. "We should factor into our judgments the real symbiotic relationship that is developing in that society between economics and politics," he urged.

What should guide our behavior, said Manoff, is the progress the Soviets make in becoming a more "normal" nation in the community of nations: "As the Soviet Union tries to normalize its political and economic processes, we as a nation should move to normalize our intercourse with that society. We ought to put our relations on a more even keel -- 'most favored nation' status, if that's what it would be called."

Richard Judy of the Hudson Institute said he starts with the premise that the U.S. does not have "a long-term, inevitable geostrategic conflict of interest with the Soviet

Union." Accordingly, our policies, said Judy, should encourage the current wave of political reforms; a more pluralistic economy and polity; a devolution of power from the Kremlin to the rest of the nation; a diminished Soviet hegemony in Eastern Europe in some orderly way; and greater Soviet focus on domestic problems. If trade can play an ameliorative role in these areas, said Judy, then it should be employed to do so.

Charles Zraket, President of the MITRE Corporation, believes we should encourage exports of commercially available computer technologies but hold back on critical military and defense technologies. The real issue, said Zraket, is the political framework in which trade would occur. "What are our goals there? How would they affect our allies in Europe and Japan? What are our relations with them? What restrictions, if any, would we have on their transfer of technology?"

Zraket said that a MITRE study conducted ten years ago found that well over 80% of technology transfer internationally is done through multinational corporations, via trade, subsidies, joint ventures, etc. Government-to-government transfers have gotten more publicity, he said, but it has been "pretty ineffective." Technology transfer is not a simple transfer for artifacts, Zraket emphasized, but a complex process in which the receiver-nation must know a great deal about the technology, including how to organize and deploy it.

Paul Spindel, President of Scarsdale Systems Group, stressed that we currently enjoy a rare "window of opportunity" for U.S. trade with the Soviet Union. Although the Soviets' inability to pay in hard currency is troubling, said Spindel, the United States should nonetheless try to exploit the immediate trade opportunities.

Leonard Sussman of Freedom House believes that the social impact of computers on the Soviet Union will be quite different from the American experience, apart from the unexpected consequences. The "networking of networks" and creation of new citizen feedback channels "must inevitably affect the political process, as well as certain trade and social processes," he said. Whether the U.S. decides to take a hardline stance, promote business intercourse, or actively provide economic aid, Sussman said that "letting nature take its course" may be all we can do to affect internal Soviet polity.

Gary Chapman of Computing Professionals for Social Responsibility said he was skeptical of whether computers can transform society. While computerization can have a profound effect on society, the impact of a "computer culture" would be marginal, he said. Furthermore, the Soviet's capability of

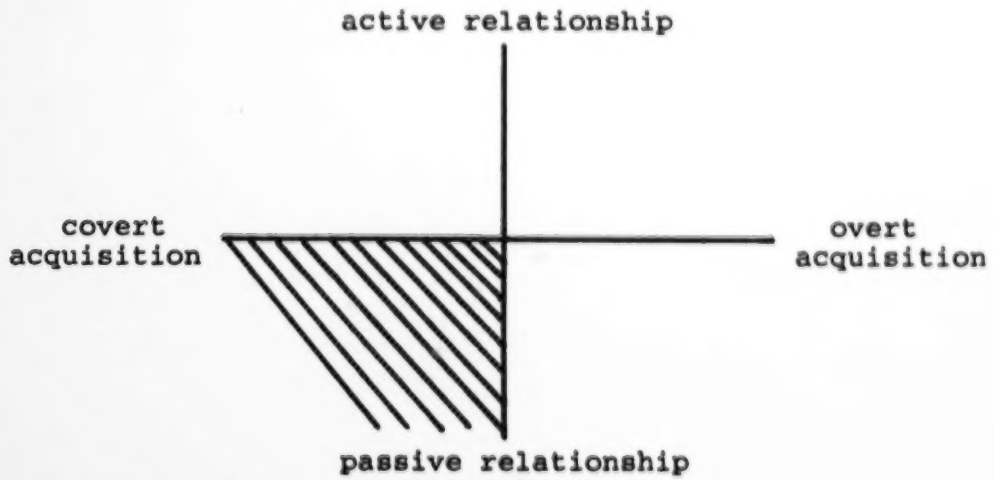
buying or producing vast numbers of microcomputers is so limited, said Chapman, that it is almost pointless to speculate about what possibilities freer trade might provide; analogies to computerization in the West just don't apply, he said.

Glenn Schweitzer of the National Academy of Sciences/ National Research Council said, "For the near term, the nature of U.S.-Soviet military confrontation will probably be the most important factor in determining U.S. policy in transferring computer technology to the Soviet Union." As for linkages between human rights and technology transfer, Schweitzer said that it is very hard to isolate those two factors from the larger context of U.S.-Soviet relations and strike any sort of meaningful tradeoff. Computers are a subset of U.S. technology policy; human rights are a subset of U.S. foreign policy.

Technology transfer is one of the most important policy levers that the United States possesses, Dr. Seymour Goodman of the University of Arizona reminded the group. In a sense, our technological superiority, by itself, has had a powerful impact on the Soviets in changing their perceptions of their economy.

Three main factors have crippled Soviet technology transfer over the past forty years, Goodman contends: 1) Export controls have significantly slowed the development of "dual use" technologies (i.e., systems with both military and civilian applications). 2) Poor long-term business opportunities for Western companies have inhibited the sale of technology to the Soviets. 3) Self-imposed controls such as protectionism, secrecy and the isolation of technical experts have inhibited the development of Soviet technology.

Goodman asked participants to picture the dynamics of technology transfer in a graph. One axis represents how active or passive the recipient is in the technology transfer relationship, while the other axis represents how overt or covert the means by which the technology was acquired:



The Soviets' policies encourage technology transfer in the bottom left quadrant, which is why their technology has done so poorly over the past four decades, said Goodman. This quadrant is the least advantageous in terms of dealing with the major trends in computerization today -- globalization, commoditization, and a broadening spectrum of technology.

At the same time, these very factors are weakening the effectiveness of U.S. export controls to the Soviet Union. The Soviets are more able to acquire low-level technology than ever before; they are letting their top experts interact more freely with their foreign counterparts; and they appreciate how backward their economy is. These factors "should be a very conscious part of U.S. policy," Goodman urged.

Nicholas Ulanov of McKinsey & Company suggested that different technology transfer policies might be appropriate for different levels of technology -- high-tech versus lower-tech, minicomputers and mainframes versus personal computers -- because each might have different effects on different parts of Soviet society. Ulanov also suggested that if the U.S. is interested in spreading technology to Soviet society, it must look to the private sector to do so. But that will never occur unless the Soviets find ways to provide "economic value" to such transactions, by making hard currency arrangements, copyright and royalty agreements, etc. Ulanov believes Eastern Europe is far more capable of providing a hospitable business climate than the Soviet Union.

VII. WHAT NEXT? PROPOSALS FOR RESEARCH AND ACTION

What research or action steps would this group recommend to guide Western interests in the uses of computing in Soviet and other Eastern-bloc societies?

Loren Graham of the M.I.T./Harvard Russian Research Center believes it is "worth the risk" to sell computers to the Soviet Union. A worst case scenario would have Gorbachev overthrown and an ugly, new regime installed, which would then use its new technologies in ways antithetical to U.S. interests. But Graham says such consequences would be mitigated by the rapid pace at which information technologies are developing. "Even if everything went wrong," he speculated, technology would have advanced so much within five or ten years that "we wouldn't have given away the store."

Richard Judy of the Hudson Institute urged that any discussion of technology transfer consider the political context of Europe. What if a left-Green coalition gained ascendancy in West Germany in 1990, which resulted in a more receptive German attitude toward the Soviets and a rejection of CoCom? Furthermore, what if the consolidation of the European Common Market in 1992 and after leads to trade in computers with the Soviets?

Judy's point, in essence, is that U.S. attempts to maintain restrictive technology transfer policies could be undermined by political events outside of our control. But Nicholas Ulanov responded that Germany and the Common Market are not likely to trade with the Soviets because the economic benefits for non-military computer trade "just aren't there."

Seymour Goodman noted that current U.S. technology transfer rules do not extend down to off-the-shelf computer products. "Already the Soviets can legally buy a wide range of computer products that they desperately need. They choose not to. There's no reason to believe that will change if export control regulations are significantly lifted." In this sense, the future is more a matter of Soviet choice: Does it <u>want</u> to import foreign technologies?

For Charles Zraket, the key issue for the future is maintaining U.S. technological superiority. "The issue is not, 'Is there a risk in sending 100,000 Apples or even 20 Crays?' I would think there is really no military risk in doing that. Pretty much every technology leaks to the Soviet Union over a matter of time, in three, five or ten years. The real issue is, how can we keep it that way? How can we ensure that, in terms of critical technologies, they're always five or ten years behind us -- and not with us, or ahead of us?"

Nicholas Ulanov pointed out that ordinary personal computers may not have much consequence for the U.S.-Soviet confrontation, but they could enhance Soviet dominance over its own population or client states. "An Apple computer makes a hell of a missile guidance system as long as you're not trying to counter U.S. forces or go intercontinental. It also makes a very good police computer." These are risks we must recognize, said Ulanov, who nonetheless believes that the risks of trading with the Soviets are worth taking.

Glenn Schweitzer of the National Research Council believes that we must consider a more expansive definition of national security to include our economic competitiveness and many other

factors as well as the military confrontation. At a high-tech trade fair in Moscow in December 1988, there were 70 West German companies hawking their wares; only five U.S. firms were there. The Germans are accepting credits from the Soviets as the condition for trade, apparently as a way to gain a toehold in the Soviet market.

In planning future research, Wilson Dizard pointed out that the issues involved are not simply bilateral; they involve the entire international community (most notably Japan, the Common Market and West Germany), who should also be consulted. New research should take these other perspectives into account.

Fitzpatrick urged that future research assess how (or if) trade in computers would affect the Soviet nationalities, an issue becoming more timely as the nationalities become more restive. She warned that future human rights abuses probably won't be directed at scientists, intelligentsia or the clergy, but at the working class, particularly unemployed workers, whose ranks are growing.

A key research need, said Robert Campbell, is to think about big-picture, historical scenarios by which the Soviet Union will become a more normal, civil society. Many conference participants echoed this sentiment.

In pursuing this task, Robert Karl Manoff thinks it is useful to think of Soviet society as experiencing "modernization without modernity." That is, the Soviet people are familiar with industrialization, urbanization, and bureaucratization, but the concomitant trends experienced in the West -- rationalization of life, reliance on the written word, and universalization of power and knowledge -- are not present. It would help to assess Soviet society in these terms, said Manoff, and study what role computer technologies might play in forging "modernity" or perhaps a "post-modernity" in Soviet life.

If we are to talk about encouraging civil society, said Marjorie Balzer of Georgetown University, then future research should consider how we can seek to diffuse Western technologies beyond the elites in major Soviet cities. The evolution of a civil society might also be studied by assessing the impact of computer technologies in Bulgaria, Romania and other Eastern European nations, recommended Harley Balzer.

For the moment, it may just be impossible to discern, in specific ways, the likely impact of computer and information technologies on Soviet society. The American experience with

computers is still too fresh to offer much guidance; the cross-cultural effects of computerization are poorly understood; and Soviet history provides few reliable signposts for the remarkable changes now being wrought by glasnost and perestroika.

Grand conclusions may prove elusive. But periods of epochal transition are precisely the ones that merit more probing scrutiny.

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